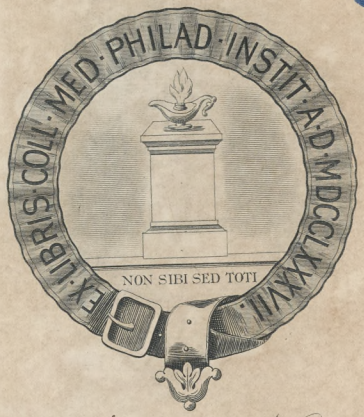
thee, but come in, and wash thy feet, and tarry here until the evening; for thou art stricken with years, and the heat overcometh thee." And the stranger left his staff at the door, and entered into the tent of Aram. And he rested himself; and Aram set before him bread, and cakes of fine meal, baked upon the hearth. And Aram blessed the bread, calling upon the name of the Lord. But the stranger did eat, and refused to pray unto the Most High; saying, "The God is not the God of my fathers; why therefore should I present prayers unto him?" And Aram's wrath was kindled; and he called his servants, and they beat the stranger, and drove him into the wilderness. Now at the evening, Aram lifted up his voice unto the Lord, and prayed unto him. And the Lord said, "Aram, where is the stranger that sojourned this day with thee?" And Aram answered and said; "Behold, O Lord, he eat of thy bread, and would not offer unto thee his prayers and thanksgivings. Therefore did I chastise him, and drive him from before me into the wilderness." And the Lord said unto Aram, "Who hath made thee a judge between me and him? Have not I borne with thine iniquities, and winked at thy backslidings; and shalt thou be severe with thy brother, to mark his errors, and to punish his perverseness? Arise and follow the stranger; and carry with thee oil and wine, and anoint his bruises, and speak kindly unto him. For I, the Lord thy God, am a jealous God, and judgment belongeth only unto me. Vain is thine oblation of thanksgiving, without a lowly heart. As a bulrush thou may-

a quarter of an inch in breadth; he keeps one hundred menial servants, and has at least fifteen barley corns in his granary. He is now chiding and enslaving the enemies who, for all that we can see, is not as much as himself.

[illegible] bank! Do not you perceive [illegible] he carries in his mouth? [illegible] hand, he would not part [illegible] about the molehill: you [illegible] undergone to purchase it! [illegible] and conditions swarm [illegible] drop out of his mouth, [illegible] obsequious circle of attendants [illegible] and leave the discarded [illegible] come to his successor.

[illegible] see the ladies of the [illegible] pismire that listens to the [illegible] same time that she [illegible] from him. He tells this [illegible] for being; that her eyes [illegible] life and death are at her [illegible] and gives herself a thousand [illegible] the vanity of the pismire on her right hand. She can scarce crawl with age; but you must know she prides herself upon her birth; and, if you mind, springs every one that comes within her reach. The little ridicule coquette that is running by the side of her, is a wit. She has broken many a pismire's heart. Do but observe what a drove of admirers are running after her.



G. B. Wood

The Circulation

[Lec. 15] In the progress of our inquiries we have now reached that stage of the course, in which it will be proper to describe the circulation of the blood. The term has been applied to that function by which the blood is carried to and from the ~~lungs~~ heart. It is of vast importance in the economy of animal beings. It conveys the blood to the lungs, where it undergoes the ~~action of the~~ process of respiration; to the glands, where it furnishes matter for secretion; and in fine distributes nourishment and animal temperature over the body. To comprehend the nature of the circulation, it is necessary that some general description of the organs subservient to its performance, should be premised. There consist of the heart, the arteries, & the veins. The heart is a muscular sac, contrived so as to expel into the arteries, the blood which it has received from the veins. But the structure would be very simple, were its only office to expel the blood into the arteries. One auricle & one ventricle would then be sufficient. But the blood is unfit for the various ends it has to fulfil in the system, till it has been renovated in the ~~lungs~~ Pulmonary organs.

The heart, then, is divided into 2 parts, one of which is ~~devoted~~ appropriated to the sending of the blood to the lungs; the other to its distribution over the body; and thus a double circulation is carried on. The more complex hearts have two auricles & two ventricles. These, though in the human subject they are placed in contact, yet in many of the inferior animals are distinct, & independent organs, being seperated some distance from each other. One is subservient to the general, the other to the pulmonary circulation. —

In describing the circulation it may be said, that the blood ~~by~~ through the vena cava enters into the right auricle, by the contraction of which it is forced into the corresponding ventricle; whence, conveyed by the pulmonary artery to the lungs, it is returned by the pulmonary veins to the left auricle. This contracting ~~it~~ empties it into the left ventricle, which, by a vigorous impulse ~~due~~ sends it into the arteries, ~~thro~~ through which it is every where diffused. Carried to the minute radicles of the arteries, it passes into the corresponding radicles of the veins, which, uniting in the great trunks, the vena cava, restore it to the ~~left~~ ~~vena~~ right ventricle

I have remarked that by the contraction of the left ventricle, the blood is impelled into the aorta: but it would flow back into the left auricle, were there not some contrivance to hinder it. Accordingly a valve ~~has been~~ is placed between these two cavities, which, from its supposed resemblance to a mitre, has been called mitralis. For a similar reason, a valve ~~has also be~~ is also situated between the right auricle & ventricle, and has received the name of tricuspis. There are, besides these two other valves, one at mouth of the Pulmonary artery, the other at the commencement of the aorta, which from their shape are called semilunar. Their object is to hinder the regurgitation of the blood when these two arteries contract on their contents. It appears that the blood vessels ~~centre a~~ emanate at one point ~~of~~ from the heart, and reunite in their ultimate ramifications: but as to their precise mode of connection, there is not the same coincidence of sentiment. By the illustrious discoverer of the circulation it was taught, that the blood is effused from the arteries into small cells, from which veins ~~arise~~ originate, and take it up. But this opinion has been contradicted by microscopical observation. Examined by powerfully magnifying glasses, the arteries of some animals, as in

the web of ~~the foot of~~ a frog's foot, or in the ear of a rabbit, may be seen running into the veins, without any dilatation at the part where one ~~begins~~ ends & the other commences. Nevertheless we have reason to believe that particular organs afford ~~some exceptions to this general rule~~ specimens of the structure mentioned by Harvey; but these must be considered as exceptions to the general rule. Thus it appears that the cells exist in the spleen, in the corpora cavernosa penis, in the clitoris of the female, or in the papilla of the breast of women. Even this, however, is contradicted by some physiological writers. Besides the two already mentioned, there are several other modes of termination. In glands a secretory duct runs off laterally from the artery, and the main current of blood continues on into the veins. Arteries are distributed on the surface of the body, on the lining membrane of the various cavities, and every where throughout the cellular tissue; & open by outlets which have been denominated exhalents. The existence of the exhalents is absolutely denied by ~~a~~ of the most distinguished physiologists. Dr. Wm. Hunter believed that the effects ascribed to the exhalents, were owing to ~~ex~~ mere exudation through inorganic pores; & Moscagni

entertained the same opinion as regards both the arteries, & the lymphatics. But they have not advanced much in support of their peculiar notions. At the same time it must be confessed that no one has ever demonstrated the existence of exhalent; though microscopic observations have been diligently made. But in as much as there is no evidence that transudation ever takes place in a living body, it is impossible to account for exhalation in another way than by the opinion which now generally prevails. — Many branches of the capillary arteries are too minute to admit the red globules. Of these we have examples in the medullary part of the brain, in cartilage, tendon, ligament, in the tunica conjunctiva of the eye, & in all the white or transparent tissues which are found throughout the body. Yet as these parts grow, like the rest of the system, it is presumed that they are nourished by secondary vessels. This may be demonstrated by injections, and by the phenomena of disease. All of you know that when the tunica conjunctiva is inflamed, its vessels previously ~~opaque~~ transparent, become filled with red & opaque blood.

The capillary vessels do not constitute a distinct vascular system; but are to be considered, on the one hand, as the extreme ramifications of the arteries, on the other, as the minute radicles or beginnings of the veins. They are inconceivably numerous, so much so ~~as~~ that when injected by Ruysch they seemed, by their inosculations, to form a net-work over the whole body. What stronger proof need we advance of their extreme minuteness, or vast number, than the fact, that hardly any part can be pricked with the point of a pin, without ~~a flow~~ an escape of blood?

The heart is an irritable organ, and is put in motion by its own peculiar stimulus, the blood. No other fluid can excite it to a proper action. Even of blood the heart demands a certain portion only for the due performance of its functions. When over-distended it is incapable of acting; or hence the circulation has been stopped by violent exercise, by strong passions, (as in the case of Hunter) or by any other cause which in a great degree determines the blood to the heart. The same effect may be produced by an undue detraction of blood. Every practitioner has seen this exemplified by syncope occurring in consequence of copious venesection, or of loss of blood by hemorrhage.

Not a little has been said, at different times, relative to the degree of power which the heart exercises in the circulation.

(~~for what follows see Richerand Chapman's edition of Richerand, pag. 185~~) — The difficulty of determining this is strikingly illustrated by the total disagreement in the estimates of different writers. Keil makes it amount to a few pounds only, while Morelli considers it as equal to 180,000 ~~lbs.~~ pounds. Before we engage in any calculations respecting the matter, the following data should be clearly established. — 1. The quantity of blood expelled from each ventricle at every contraction. — 2 — The degree of velocity with which it is expelled. 3 — The amount of resistance which each ventricle has to overcome, before it can propel the blood into its corresponding arteries. — 4. The effects of the action of the heart on the blood. — But these are points which most probably will never be ascertained with any sort of precision, and of course our computations must as heretofore remain vague, & conjectural. All we know with certainty on the subject is, that the heart is a muscle of great strength, as is evinced by the phenomena of the circulation, & further by the fact that, if the heart of a living animal be grasped, no effort of the hand will repress its action. —

An inquiry far more interesting here presents itself. Why, as has been frequently asked, does not the heart become exhausted by exertion, like the voluntary muscles? Many answers to this intricate question have been attempted, no one, however, entirely satisfactory. I will not detain you by relating the idle hypotheses of Des Cartes, Silvius, & Borri. Even those which I shall introduce to your notice, ~~are~~ owe much more to the celebrity of their authors, than to their own intrinsic merit. —1st— By Stahl it is altogether imputed to the intelligence of his anima medica; a guardian power, that foreseeing the danger to which the system would be exposed by a remission in the action of the heart, ordains it otherwise. This is pure hypothesis, & of the most wretched kind; by the adoption of which we only cut the knot that perplexed us to untie. What is more opposite to our ideas of an intelligent principle, than that it should direct operations of which it is totally unconscious? Is it to be supposed that every insect, ~~can be aware~~ every worm that crawls on the ground, should foresee the consequences of interrupting the circu=

lation, a function which is entirely unknown to an infinite majority of the animated beings in whom it is performed. Nor can there be any thing more unphilosophical, than to seek for an explanation of physical phenomena, by the interposition of the intellectual faculties. —

2d. By Willis it is maintained that the voluntary muscles derive their nerves from the cerebrum, while the cerebellum supplies the heart & other involuntary muscles; & hence he infers that the one set is thereby fitted for temporary, ~~and~~ the other for permanent, & uninterrupted action. Till the middle of the last century, this theory was received without modification. Boerhaave suggested some additions. He conceived that the action of the heart was excited by the presence of blood in the coronary vessels, & in the cavities of that ~~heart~~ organ. The whole hypothesis is predicated on premises ~~wholly~~ entirely incorrect. No one has shown that the two sections of the brain possess this difference. On the contrary, the distribution of the nerves which arise from both, ~~are~~ is indiscriminately, sometimes to the voluntary, & ~~at~~ sometimes ~~than~~ to the ~~such~~ involuntary muscles. —

Lec. 16. The third theory was that of Haller. Every muscle he conceived to be endowed with irritability. This varies in different muscles, not only as regards degree, but also in its not being obedient to the same stimuli. The nervous influence is the natural stimulant of the voluntary muscles, and through this medium they are called into action at the instigation of the will. It is otherwise with the involuntary muscles. Callous to the operation of the will, they obey only their own appropriate ~~st~~ irritant. Of the heart the proper stimulus is the blood. From these premises it follows, that the motion of the heart is unceasing, because its irritability is inexhaustible, and because blood is constantly supplied. These are the only conditions necessary to perpetuate muscular action. To prove this he alledges:— 1st. That though the communication between the brain & heart is interrupted, the action of the heart is still retained:— 2nd.— That ~~the when~~ though taken out of the body, it yet continues to contract for some time:— 3rd. Though the nerves going to it from the medulla oblongata & spinal marrow be irritated, yet the heart is not all affected.— This hypothesis, however beautiful, is liable to a great many objections; but it is subverted from the foundation by the late experiments of Legallois. As the result of the whole that has been done on this subject, it may be stated, that in an animal which has been decapitated, the action of the heart does not cease immediately on account of the removal of the head; but that its cessation is ~~not indirect~~ an indirect effect of the suspension of respiration. It has even

been proved, that though the head be taken off, yet, if the lungs are ~~respiration~~ artificially ~~excited~~ inflated, the action of the heart is restored. But if the spinal marrow be destroyed, the heart loses entirely its power of regular contraction. The inference is plain, that the spinal marrow, and not the brain, is the source of motion in the ~~brain~~ heart. It may be further inferred from the experiments alluded to, that the motion of every part depends on that section of the brain or spinal marrow, whence the nerves supplying it are derived. – The ~~discussion of the~~ question started in the last lecture, opens a wide field for discussion: but to pursue it further would be to anticipate. All that I shall add at present is, that there is nothing in the heart which should confer on it the power of perpetual motion. – Endowed with irritability, & susceptibility to the influence of the blood, it has regularly its systole & diastole, the one occasioned by its appropriate stimulus, the other by that tendency which all muscles have to ~~rel~~ relaxation after they have been exerting themselves. That blood is the proper stimulus of the heart, may be proved from the fact, that the left ventricle ceases to contract first, because first deprived of blood. This is owing to the difficulty of circulation through the lungs; while the opposite side is copiously supplied by the vena cava. – The heart is also influenced by the condition of the coronary vessels. It is well known that if venous blood gets into the left side,

into the coronary ~~veins~~ arteries, death is the invariable consequence. To this Mr. Goodwin endeavoured to explain this by supposing a want of power in the venous blood to stimulate the heart. But this will not apply to the right side, which receives no other than venous blood. The explanation here fails. ~~A better one~~ ~~The body~~ Mr. Goodwin's theory was of course abandoned, and the subject remained unaccounted for till Bichat's explanation appeared. He states that ~~the~~ death is not occasioned by a want of power in the venous blood to stimulate the left ventricle; but by its getting into the coronary arteries. - Like all other organs, the heart is supported by its appropriate vessels; and a want of the necessary supply of arterial blood in these, will, as in other cases, destroy its power of action.

The Arteries are conduits or tubes conveying blood over the body. Beginning by a large trunk, the aorta, in the left ventricle ~~of the heart~~, and sending off branches almost infinite in number; they are not inaptly compared to a tree, whose root is in the heart, and whose ~~rami~~ numerous ramifications extend in every direction. ~~The~~ Their size decreases the further they proceed from the heart; ~~but~~ they are not, however, tapering or conical, but rather cylinders gradually diminishing. As the ~~capacity~~ diameters of all the arteries taken together exceeds that of the trunk, their capacity is increased the further they extend from the heart. Their direction is of-

ten tortuous, ~~as in the hollow viscera~~ and this arrangement is particularly obvious in the hollow viscera, as the uterus, heart, stomach, & bladder; and in those parts where ~~there~~ ~~is~~ much ~~motion~~ distention is necessary, as in the cheek &c. — As they proceed from their primary source, they form anastomosis in various ways. — These are sometimes in the form of arches, as in the mesentery; sometimes the ~~ca~~ vessels join at an acute angle, as in the Basilary artery; and sometimes they are united by branches running directly transverse, as in the Brain. — The use of each of these modes of arrangement, is ~~with~~ according to circumstances, either to retard, or accelerate the circulation. —

The arteries have 3 coats; the external is cellular & elastic; the middle is fibrous; & the ~~of~~ inner one ~~is~~ very attenuated, ~~smooth~~ ~~and~~ ~~with a~~ beautifully polished, and serves as a lining to the others. There has existed not a little discussion relative to the muscularity of the arteries. Haller says the small arteries ~~have~~ do not possess ~~a muscular fibres~~ contractility, and the large ones only in a slight degree. But he is wrong. Every portion of the arterial system contracts. In the larger ~~arteries~~ vessels it may be seen by the naked eye, and the contractility increases as the arteries proceed from the heart. The capillaries possess ~~this~~ muscularity in a greater degree than any of the others. This was first remarked by Cullen,

and was afterward confirmed by Jno. Hunter. The muscular fibres cannot, indeed, be demonstrated on account of the minuteness of the vessels. But they contract, (and this power resides in muscles alone) and independently of the heart. Yet still it is a question whether the heart alone carries on the circulation, or whether it is assisted by the arteries. Harvey maintained the former opinion, and has not been without followers. Granting to the heart the chief agency in the business, it is also true that the arteries exert some ~~on~~ power; in general auxiliary to the heart, though sometimes independent. ~~Of~~ Numerous facts may be adduced in confirmation of this opinion. 1st. Muscular energy resides in all arteries, large or small, in the main trunks, & in the extreme capillaries. 2nd. As the arteries contract with considerable force, the unavoidable effect is to propel the blood. 3rd. The circulation has been kept up in the fœtus, though entirely destitute of a heart. Cases of this kind have occurred so often as to leave no doubt of the fact. Nevertheless it may be alledged, that in these cases, as often happens in the animal economy, the want of one organ is ~~generally~~ supplied by an increased energy, or by an entire change in some other. I do not see much force in the objection; but as it might be advanced, I will appeal to other facts, which are of themselves sufficient to show the independent action of the extreme vessels. It is shown by the phenome-

na of local inflammation, of active hemorrhagies, of blushing, and of hectic suffusion. — Enough has been mentioned to show that the circulation may be increased in particular parts, without any general effect; consequently, that the arteries may act sometimes independent of the heart. —

Veins are those vessels whose office it is to carry the blood back to the heart. In their general construction they resemble the arteries; like them have 3 coats; but they are thinner, not so strong. They are more numerous than the arteries. In some places each artery has 2 accompanying veins, besides others seated in superficial parts. An idea may be formed of the general disproportion between the two sets of vessels, from a computation that of 28 or 30 lbs. of blood, the medium quantity contained in an adult, 9 parts circulate in the veins & only 4 in the arteries. — — Veins have another peculiarity; & allusion to their valves. But this structure prevails only in those which are exposed to lateral pressure. The use of the valves has been supposed to be consist in preventing the weight of the column of blood from pressing on the ~~lower~~ inferior parts; but their real advantage is the obstruction which they afford to the retrograde motion of the blood. This is proved by the fact that deep seated veins, and those which come from the viscera, ~~have particularly~~ are entirely destitute of valves. — Most generally veins accompany the arteries; though there are some exceptions to

the general rule; - as in the brain, liver, & bones. — As muscular fibres are not very conspicuous in the veins, it has been asked, how is the blood conveyed to the heart. Some suppose that this is effected by the combined power of the heart & arteries; - but ~~this~~ their impulse ~~power~~ is lost in the capillary vessels, or at least is not sufficient to raise ~~the~~ so great a column of blood! - There are, I think, 3 causes which operate to produce the end proposed; the most efficient of all is the contractile power of the veins themselves. I am aware that this property has been denied to them by many who have spec- ~~to exist in the coats of the~~ ulated on the subject. ~~veins~~. It has, however, been shown by Haller, that the Vena Cava are muscular, & Jerschuyr & other respectable physiologists have detected the same structure in the more minute veins. There is one circumstance which of itself should convince us of the contractility of these vessels; - they always adapt themselves to the quantity of blood they contain. Cooperating with the above cause is the ~~contractility~~ action of the muscles; which may be illustrated by the familiar operation of venaesection. When the Blood ~~flow~~ issues languidly from the orifice, nothing promotes the flow so effectually as to grasp something firmly in the hand. This operates by bringing into action the muscles of the fore-arm & humerus, ~~which contracting~~ which compels

the veins. - An auxiliary means of propelling the blood may be found in the action of the neighbouring arteries. This, however, is a slender assistance; and the first two are the principal agents in the business. Compared with the mechanism which produces the arterial circulation, these 3 causes are extremely feeble. But here, as in other instances, nature has adapted the means to the end proposed.

What proofs are there that the circulation is carried on in the manner I have described? We know it from the direction of the valves of the heart, of those of the arteries & veins, and from other circumstances of no less conclusive a character. In a wound of an artery, the blood flows from that part which is nearest the heart; and in an opposite direction when a vein has been opened. ~~Compre~~ Compressed by a ligature, the arteries swell above, the veins below. Examined by powerful magnifying glasses, the circulation may be traced in the Salamander, and some other animals. By the ancients it was supposed, that while the heart & arteries contained air only, the veins served as the reservoirs of blood, which ~~the~~ was distributed during the day, & returned in the night. They compared the circulation to the waves of the Euripus, ~~which th~~ whose currents, according to the poets, ran in opposite directions. About the middle of the 16th. ~~and~~ century, there was some=

thing like an approach to the discovery of the circulation in the lungs; though little was known relative to its precise nature. About the year 1619 when Harvey first proclaimed his discovery, so little were the minds of physiologists prepared for such an event, that it burst upon their minds as an entire novelty. We should be surprised that so obvious a circumstance remained so long undiscovered, did we not recollect many ~~other~~ parallel instances. Mankind from the beginning of the world had been accustomed to see the fall of an apple, but to the comprehensive genius of Newton was reserved the discovery of the cause. Truth perhaps, in all ~~Sub~~ subjects, lies nearer the surface, & is lip disguised, than the pride of learning permits us to suspect. —

Nutrition

Lect. 174. It was stated by me on a preceding occasion, that the living body undergoes the process of alternate destruction, and renovation. This revolution is so rapid and complete, that, according to some physiologists, every part of the animal is renewed in 7 years, according to others, once in 3 years. Estimations of this kind are unavoidably wanting in accuracy, because we have no correct data from which to calculate. But, though there is much of difference in the results, yet the general fact that such a change does take place, is not disputed. In this process two powers are concerned. Of the functions of the lymphatics we have already copiously treated: we are next to inquire by what means the waste occasioned by these is replenished. This is accomplished by depositions of nutritive matter from the extremities of the arteries. But that you may comprehend more fully the nature of the subject before us, I will briefly recapitulate some of the principal circumstances which have been already detailed. The food having been mixed with the saliva, & received into the stomach, is there converted into chyme, a soft, uniform fluid of a grey colour, in which the previous texture, and properties of the aliment are no longer distinguishable. The solvent power of the gastric liquor, is the chief agent in the pro-

duction of these changes. As soon as chyme enters the intestines, it unites with the bilious, pancreatic, & intestinal fluids; and the result is a white ~~fluid~~ liquor, which, however various the ingredients from which it is elaborated, exhibits, under all circumstances, an unity, and similarity of appearance, and composition. With the exact process of chylification, we are unacquainted. ~~But~~ Be this as it may, the chyle is taken up by the lacteals, undergoes some change in its passage, is deposited in the circulation, and incorporated with the blood. It next passes into the lungs, and, being exposed to the action of atmospheric air, undergoes those alterations which have been previously noticed. Here terminates the process of sanguification. But what office is the blood destined to perform in the animal economy? Every part of our structure is subject to waste, either from accident, the ravages of disease, or the constant action of the absorbent system. Materials are required to supply the loss thus effected. The bones demand phosphate of lime & gelatin; the muscles demand fibrin; & the cartilages & membranes require supplies of albumen. The operation by which these are extracted from the blood, & appropriated to the supply of the various parts, is denominated nutrition. How this is accomplished it is impossible even vaguely to conjecture. That it does exist, however, we have the most ample evidence. The union of fractured bones, the

filling up of ulcerated cavities, the healing of wounds by the 1st. intention, not to mention the phenomenon of growth, are facts which indisputably point out the existence of such a function as nutrition. All that we know with certainty is, that nutritive matter is taken from the blood, and deposited wherever the exigencies of the system require. But how it is done, and why one set of vessels give out one species of matter, another of the same apparent structure, another species, is at present a mystery, & will most probably ever continue so. To say that it is owing to animal appetency is a mere truism. —— It has been said that growth is a mere addition of parts similar in their nature, like the increase of a stone. But the cases are very different. In a living state the new part possesses the peculiar organization of the parts to which it is added, & becomes identified with it in structure, & resembles it in configuration, and general appearance. The power of moulding & perfecting the newly deposited matter, is appropriated to the absorbents; and this is not the least curious office belonging to these vessels. By the arteries, the matter is often profusely & roughly deposited, as in fractures, & ulcers. The absorbents get to work, ~~remove~~ blunt the asperities, & ~~the~~ remove redundancy of the callus in bones; & in ulcers level, smooth, & symmetrize the often rough, and prominent cicatrix.

Conformably to what has been said it follows, that nutrition is a compound process, in which two opposite and antagonizing powers are engaged. While the arteries are busy in secreting, the absorbents are no less active in removing the various parts of the frame, so as to make room for the new depositions. Thus in progress of time the body loses its original composition, and is completely regenerated. —

Besides its direct subserviency to nutrition, the blood is also employed in furnishing the different secretions. — But though the names are not the same, yet there is no actual difference between the two processes. Nutrition, in every sense of the word, is truly & completely a secretory process. Several other functions may be ranked under the same term. — Digestion is nothing more than a secretion of chyle, from the excrementitious & facal parts of the aliment. Is not absorption the separation of the matter absorbed from that which remains? Can we consider respiration in any other point of view, where a secretion of the carbon takes place from the venous blood? The body may, indeed, be considered as a laboratory, under the superintendance of the vital principle, in which the various functions of the animal economy, are constantly employed in compounding, & decomposing, in effecting the synthesis & analysis of ~~all~~ the objects within the sphere of their action; all the results of which are so many secretions from the blood. —

Secretions

As the secreted fluids are distinguished by certain properties peculiar to them, ~~it~~ several attempts have been made at a classification. The Ancients divided them into ~~excretions~~ secretions, ~~and~~ and excretions; but the circumstance of the latter's being thrown out of the body, does not ~~render~~ at all invalidate their claim to be considered as secretions. Nor should the distinction be retained, as it is apt to lead to erroneous conceptions of the process. — Chemistry, having detected a still greater variety of properties, than the external qualities gave reason to apprehend, has proposed an arrangement on this foundation. But, however convenient this may be to the cultivators of that science, we as physiologists cannot acquiesce in such a distribution. — By secretion we understand that process, by which a fluid is produced ~~out~~ different from those materials out of which it is formed. As these fluids are various, according to the structure of the organ which elaborates them, the most natural basis ~~of~~ for a classification is here afforded.

Every secreted fluid has a peculiar apparatus adapted for its production. The least complex of these, are ~~a~~ certain membranes made up principally of a series of arteries & veins, from the lumen of which small ~~secretory~~ ducts open. Such

are the lining membranes of the stomach, trachea, nose, fauces, urethra &c, & also those parts which go under the denomination of secreting surfaces. — Whether rectilinear arteries, or such as run in straight lines, are alone adequate to secretion, is a point difficult to determine. It is, however, wholly unworthy of serious inquiry. Generally, the vessels designed for this purpose pursue a tortuous & irregular course; and this structure is evidently intended to retard the circulation of the blood. The exhalent vessels of the skin, & those of the serous membranes, the former producing perspiration, the latter watery effusions in the cavities of the body, are, perhaps, exceptions. Yet these fluids must be considered as having undergone a secretory action; as neither of them is to be found in the blood, exactly of the same consistence as after it has been separated. —

The secreting organs next in simplicity are the mucous follicles. These are small holes to be found in the mucous membranes, containing generally a quantity of sebacious matter: they exist also at the root of the tongue, and other parts. As yet their structure has not been accurately described. They are generally considered as an imperfect species of glands, consisting of a convolution of vessels. Probably their structure is very nearly like that of the conglobate glands already mentioned. —

The more perfect secretions, as bile, semen &c. require more perfect organs for their elaboration. These are called conglomerate glands, (to distinguish them from the conglobate, which belong to the absorbent system.) and constitute the great abdominal viscera, as the liver, kidneys, pancreas. Much difference of opinion has existed relative to their structure. Malpighi maintained that their arteries terminated in cells, or follicles, in which their secretions were deposited: but this was utterly denied by Ruysch, who, by injections, proved that their substance is principally made up of convolute arteries terminating in veins, & giving off excretory ducts.

The Apparatus is now before us; but as to the modus operandi, the question is yet to be solved. Physiologists with regard to this have maintained various sentiments, which have all received a complexional hue, from the prevailing opinions of the time in which they flourished. Thus, during the predominance of chemistry in the schools of physiology, they resorted to fermentation, or something analogous, as the process by which secretion was accomplished. But when the mechanical notions began to prevail, secretion was explained on the principles of geometry. The size of the vessels, the angle of

ramification, and a great deal more of such stuff, equally pertinent, & elucidatory, were introduced into the discussion of the subject. It was supposed that certain arteries were adapted for the passage of particles of one shape, others for those of another; and thus was attempted to be explained, the difference in the secreted fluids. Circular, triangular, & square particles were dedrawn into the hypothesis. - Another set of the geometrical ~~school~~ school maintained, that the arteries became so small as to allow only the fine parts of the blood to pass. - Even at the present time, there are not wanting some, who consider the glands as a species of strainer, by which the grosser parts are seperated from the fine, as when a liquid is strained thro' a sieve. All ~~the~~ explanations, however, on mechanical principles are done away by the fact, that the products of secretion, differ from any thing which is to be found in the blood. - In the present rectified state of our knowledge, we are enabled to come nearer the point. We seek an explanation in the resources of chemistry, operating under the laws of vitality. It may reasonably be supposed that little else can here be advanced than mere conjecture. ~~E~~ It

Even this, however, if tolerably plausible, is not to be rejected. — The blood is an exceedingly compound substance, consisting of carbon, hydrogen, nitrogen, oxygen, sulphur, phosphorus, and a minute portion of lime, iron, potash, and soda. Whether all these substances are derived from without, or whether they are created by the animal organs, is a point not satisfactorily determined. The mode by which some are received in the body is very intelligible; though for others there is no obvious source. The latter, especially phosphorus, iron, and lime, as their presence cannot otherwise be accounted for, must be elaborated in the body. The fact, indeed, as regards these 3 articles, rests on demonstration. Each of them has been detected in animals, which have been kept on aliment that could not contain a particle of them. Abernethy took some seed, & having moistened, placed them in flannel, & confined them under a receiver. Yet the plants produced from them contained substances entirely different from the water or the confined air. — But whatever may be the precise origin of these various ingredients of the blood, no one doubts their existence. Nor is it less certain that these are the only sources, whence all the secretions are derived.

It has been stated that all we know of the structure of glands, is that they consist of a series of convoluted vessels. Now it is impossible to conceive, ~~that such a diversity of results should arise~~ how from the mere action of these vessels, the blood should produce such a diversity of results. It is not assuming too much to suppose that a play of chemical affinities takes place ~~in~~ between the component parts of the blood, in secretion. By some it has been surmised that this happens between the substance of the gland, & the elements of the blood. Nothing is so ridiculous as such a supposition; for a certain consequence would be a destruction of the glandular ~~and~~ structure. Nor is it necessary to explain the phenomenon. Compounds are liable to decomposition, or to a change in their condition, exactly in proportion to the number of principles of which they consist. A slight disturbance in their parts creates new combinations. ~~It is presumable that the b~~ The blood is a compound of this kind. It is presumable that in its passage through the circulation, as well as in the glands, it experiences a change in the proportion of its elements, and that this change is various according to the peculiar structure of the part in which the blood may happen to be. Considering how numerous are the

elements, & how variously they may be situated with regard to one another, may we not imagine an infinity of results? The different combinations into which the ~~elements~~ principles of the ~~blood~~ enter, are brought about by the structure of the part through which it passes. Thus bile differs from semen, because the ~~blood~~ in passing through the liver undergoes a change in the relative position of its elements, different from that which takes place on its passage through the testicle. — How ~~different~~ numerous are the ~~ingredients~~ substances which may be produced from a combination of only two ingredients! Thus oxygen & nitrogen ~~as~~ may be combined so as to form atmospheric air, nitrous oxide, nitrous ~~acid~~ oxide, nitrous acid & nitric acid. No two substances are less alike than common air & aqua fortis; yet they are composed of the same ~~substances~~ materials, differing only in the proportion of their ingredients. If these two gases produce such various results from their combination in various proportions, what a vast number of ~~substances~~ articles, how different, & even opposite in their qualities, might not be formed from so complicated a fluid as the ~~blood~~.

Lec. 18th. The chemical theory which I stated yesterday, affords a very simple and imposing view of the ~~subject~~ function of secretion. But we should not, therefore, be seduced too hastily to adopt it. That in the secretory organs, a chemical action does take place in the mode I have described to you, cannot be denied. But as every attempt to imitate it out of the body has failed, we must suppose that there is some power which controuls the operations, and that this power is the vital principle. That such is the case is supported by the consideration of the immunity which the organ enjoys, while the process of secretion is going on. The protection of every part of the digestive, assimilative, nutritive, & secretory systems, is wholly independent of chemical laws. If this were not the case, as each of them is composed of the same elementary parts with the blood itself, they would come into the play of chemical affinities, and experience changes in their structure & composition; as in fact takes place after death. The stomach during life resists the action of the gastric juice, by which after death ~~dissolution, the~~ it is frequently dissolved. — Besides, secretions are retarded, promoted, or altered in their nature by causes which act only on the general system. Different states of mind have great ascendancy ~~influence~~ over the process, in modifying the products; & effects not less striking result from an interruption of nervous influence. Mr. Haighton has shown that if nerves going to any secretory organ be partially divided,

its action is much diminished; and if they be completely cut through or destroyed, it entirely ceases to perform the function of secretion. The more recent experiments of Mr. Brodie have ascertained, that when an animal is decapitated, all the ~~sere~~ secretions are interrupted, though the circulation be continued by artificially inflating the lungs, ~~tho~~ ~~the usual changes in the blood effected~~. What is also curious, the blood in this instance exhibits all the changes which are usually effected by respiration; yet still nothing is secreted, and there is no evolution of animal temperature. Some amphibia were made in this way to live 24 hours, & during the whole time exhibited the phenomena mentioned above. These facts lead to a consideration of morbid secretions. Every practitioner of physick has had occasion to observe the effect of certain articles of the materia medica, in increasing if not altering the secreted fluids:- such are seneca, mercury, squill &c. - Other causes so impress the ~~bo system~~ body as to produce an entire change in the products. Common inflammation will often cause a secretion of pus, from those parts which had before produced mucus, or serum. - Among circumstances of this nature, I must not omit to mention certain morbid secretions, ~~which~~ produced by a specific contagion. - This is very curious, & worthy of the closest attention. What is more extraordinary than that a particle of virus inserted under the skin should produce so great

a change as is observable in the hydrophobia, the vaccine & variolous pustule, and in syphilis. More than one hypothesis has been advanced to explain this phenomenon. By the older chemists it was held, that a particle of the virus, entering the circulation, acts as a kind of ferment, assimilating the whole mass of blood to its own nature. Need I inform you that this is opposed by the whole tenor of the medical creed which I inculcate. To my mind nothing is more clear than that every change in the fluids, is produced through the intervention of the solids. Not the slightest proof exists that the fluids are contaminated by mixture with extraneous substances, much less that in this way any influence is exerted over the secretions. A fact which overturns the whole doctrine is, that no disease can be propagated by inoculation with the blood. Many attempts without success have been made to communicate in this way, the small pox, measles, syphilis, & hydrophobia. Even the blood & flesh of animals dying of canine madness, have been eat with impunity. The fact is that the proximate cause of all secretions is the same. It consists in a certain condition of the vessels, variously modified by impressions made on them by different articles, from which results a change in the relative position of the elements of the blood, and consequently a new combination. Every variety in the secreted substances, may

be explained on this principle. The vessels which at one time secrete mucus, at another will produce a morbid virus, because they are differently excited. Thus it is in gonorrhœa with the vessels of the urethra. — No less curious in its nature, is the power which certain animals possess of secreting deleterious poisons: — as in this class are many reptiles & insects, especially the serpent & the spider. — Other animals are distinguished by secretions peculiar to themselves. The ant, for instance, pours out a fluid of a specific acid nature; the scuttle fish a dark liquor; and the skunk a urine exceedingly offensive. The two latter are intended as means of protection. The skunk by the horrid stench of his urine repels the attack of many animals; & the scuttle fish when pursued muddies himself in a dark stone, which serves the purpose both of concealing him from view, and of driving off his adversary by its offensive smell. —

As regards the human species, the principal secretions are lymph, saliva, bile, the pancreatic juice, semen, urine, liquor of the prostate gland, milk, gastric juice, tears, fat, the mucous & serous fluids, synovial liquor, & the menses. I shall not occupy your time with a chemical analysis of each of these fluids; nor shall I, more than I have already done

describe the organs by which they are produced. There is considerable uniformity in their visible structure; and with their slight variations you will be made acquainted by the Professor of Anatomy. In dismissing the subject, it will not be superfluous to remark that the production of bile is peculiar in one respect. While every other secretion takes place from arteries, a vein is subservient to this. The Liver like all other glands is supplied by an artery which ramifies through its whole substance. But this is comparatively small, and designed merely for the nourishment of the part, as the Bronchial arteries serve to nourish the lungs. Besides this, there is another vessel which takes blood to the ~~liver~~ liver, called the vena portarum, and made up of the veins which come from the different abdominal viscera. By some writers it has been considered as an artery, because the bile is secreted from it: but, though in this respect it resembles an artery, yet it cannot come under that denomination, as it carries venous blood. Both the vena portarum & the hepatic artery terminate in the hepatic vein, which empties into the vena cava. The former also terminates in small cells of the liver, whence small ducts arise, and united, convey the secreted bile, to the alimentary canal.

The preceding is an account of the circulation in the liver. As before stated it appears that bile is elaborated from the vein. But this is not universally the case. The veins of the ~~vere~~ abdominal viscera have been known to enter the vena cava seperately, without forming the vena portarum. Of this there is an example in the Hunterian Museum. On other occasions the vena portarum is formed, but entirely shuns the ~~liver~~ liver, being directly inserted into the cava. A case of this kind is mentioned by Abernethy, and another is recorded in the Medical & physical journal of London. These cases are sufficient to show that the hepatic artery is capable of secreting bile, when circumstances call for such an action; and also illustrate that law of the animal economy, by which, when there is a deficiency in any organ, the want is supplied by an assumption of power in some other. It has been a question whether the hepatic artery does not always assist the vena portarum. In support of the sentiment, it has been said that if the hepatic vein be tied, & the artery injected, the vena porta becomes distended. The fact is not clearly established; and even if it were, I see no reason to draw from it the conclusion that the artery is at all subservient

to the function. For as there is a connection between the vena portæ & the hepatic vein, & between the latter & the hepatic artery, the fluid injected into the artery might very well, through its corresponding vein, reach the first mentioned vessel. There is then no direct proof that the artery assists in secretion; & the supposition is opposed to the whole tenor of analogy. —

I have mentioned that the menses are a secretion. This is no new opinion of mine:- I have inculcated it ever since I have been a teacher. Every other opinion is totally irreconcilable with facts. Many of the ancient crude notions respecting them have been totally discarded; or at least are maintained by none whose knowledge has kept pace with the improvement in Physiology. — Nobody pretends at present to impute them to lunar influence, to fermentation, to the venereal appetite, or to general plethora. A local congestion of blood in the uterus is the only one of them which has many supporters. — That at the period of menstruation there is an accumulation of blood in the uterus, is not denied. But every other gland when called upon for an extraordinary exertion, becomes the centre of flux-ion, towards which the current of blood is directed. This happens in all secreting organs, but more particularly in

those whose action is periodical. As all the secretions are elaborated from the blood, the effect above stated, is necessary to its formation in any quantity. So far local congestion is well founded. But were this the sole cause of the discharge, the menses should be pure blood, which they are admitted not to be on all hands. — (For the proofs that the menses are a secretion see Dr. Chapman's Edition of Kiernan. p. 278.) — Every organ of secretion has its peculiar stimulus. That which causes secretion in the uterus, is derived most probably from the ovaries. Whether there are imperfect or wanting, from congenital organization, or from disease; or whether they are wanting from extirpation, the effect is the same. In such cases the menses never appear. — In St. Thomas's hospital of London, there was a remarkable instance of the effects resulting from the want of ovaries. A woman who belonged to the house, and attended as a nurse, had a very masculine appearance. She was destitute of mammæ, & had a remarkably narrow pelvis. After her death Mr. Astley Cooper examined her, and found that there was no hair on the pudendum, & that the ovaries were wanting. The woman had never menstruated, and had always shown an aversion to men. — The

experience of every practitioner must have taught him, that when the ovaries are in a scirrhus state, dropsical, or affected with other diseases, so as to interrupt its functions, the menstrual discharge is interrupted, or never occurs. — Upon the whole then there can be no doubt but that the menses are a secretion, and that the ovaries supply the influence. —

Pathology.

Lec. 1

By a very natural transition, we now pass from the exhibition of the body in a healthy condition, to the consideration of it as altered by morbid impressions. That I should dwell on this subject is the more necessary, as I have no work to which I can refer you for information. Nearly a century has elapsed since any book has been published, professedly on this department of our science. You may well conceive how antiquated must be the notions ~~of~~ which it contains. The work of Gaubius, to which I allude, is only interesting, as it affords ~~the fullest~~ a luminous exposition of the doctrines of the Humoral Pathology. - In compiling my lectures, I have been assisted only by such information as ~~is~~ I could acquire from general reading, & by my own ~~ob~~ observations & reflection on the subject

The term pathology is of greek origin; and ~~literally~~ literally signifies a discourse, or dissertation on disease. At present, ~~in~~ in its most extensive sense, it embraces the consideration of the causes, nature, differences, seats, symptoms, & effects of every morbid affection to which the human system is liable. It is in fact the history of the diseased condition of the body, and is the reverse of Physiology, which, as you will know,

treats of the functions of our system in their healthy ~~condition~~ state. But in treating on the subject, I shall not, at present, enter into a detail of all the circumstances included under ~~this general term~~ it. I shall limit myself to a general account of the causes, deferring the other parts till I shall come to the Practice of Physick, and to the consideration of each disease seperately. The connection will thus be better preserved, & the whole will be rendered more interesting & instructive. In the schools of Medicine, the causes of disease have been divided into 4 kinds; - the remote, the predisposing, the occasional or exciting, & the proximate. Causation, therefore, may be considered as a chain of 4 links. By the remote cause is meant, whatever predisposes to any disease; & the circumstance exciting this predisposition into action, is the occasional or exciting. The proximate cause is defined by Gaubius, who was followed by Kirk, "ipse morbus" - the disease itself. But this will be rendered more intelligible by giving an illustration. The common inflammatory fever will answer our purpose very well. Cold, the remote cause, induces debility or that state of the body which constitutes the predisposition; the heat of a room or some other stimulant agent, is the occasional or exciting cause; & a disturbance or derangement of the system is the proximate cause, or the fever itself. Hence it follows that really there are but two causes; since the predisposing is only an effect of the re-

mote, and the proximate of the exciting cause. Some diseases have no more than a single cause. Of this kind are Small pox - Hydrophobia - Tetanus, not to adduce a greater number of examples. Can we not in these instances, trace up the disease immediately to the virus ~~into~~ applied to the skin, or to an injury of the nerve, without any interposing debility, or subsequent excitation? What happens when a large quantity of poison is taken into the stomach? The effects are immediately perceptible; and there is ~~no time~~ not time sufficient to suppose a predisposing or an exciting cause. - Without impeaching the general correctness of the ~~general~~ proposition, that debility is always the cause of disease, there are exceptions enough to show, that it is not universal; for in some cases, neither a predisposing nor an exciting cause is necessary to the most violent ~~diseases~~ morbid affections.

The Remote causes may be divided into such as are inherent in the system, & such as are external. As examples of the inherent may be mentioned natural or acquired deformities. A narrow chest, depressed sternum, crooked spine, large head, imperforate anus or hymen, give rise to many diseases. To the same class may be referred what are called hereditary dispositions. The diseases which are derived from inheritance are principally, gout, epilepsy, mania, scrofula, rickets, & Pulmonary Consumption.

To ascertain how this inheritance is effected, & on what it depends, would constitute an interesting inquiry. It is commonly said to proceed from ancestral taint or contamination. But no definite meaning can be attached to phraseology so indistinct. The explanation had its origin in the doctrines of the Humoral Pathology. - Even admitting the contamination of the fluids in Consumption & Scrofula, which, however, I am by no means prepared to do; we could hardly, ~~on the principle~~ suppose the occurrence of such an event in explain ~~the inheritance~~ of Epilepsy & Insanity. All that we know with certainty on the subject is, that those children who most resemble their parents in external aspect, resemble them also in their internal conformation, ~~& in this par~~ hence are found to have a peculiar aptitude for the diseases of inheritance.

Other states of the body predispose to disease. These are called Temperaments, and have been divided into 4 kinds; viz. the Sanguineous; the Bilious, the Phlegmatic, & the Melancholic. Much ~~has been sa~~ dispute has existed on the theory of these different conditions of the system. By all the writers of antiquity, they were attributed to the various proportions of the different fluids. Thus, the Sanguineous was thought to ~~be~~ arise from a predominance of blood, the bilious from bile, the phlegmatic from phlegm, the Melancholic from what was called black bile.

Boerhave's ~~opinion~~ theory ~~was~~ is not very different from this, and, allowing for his attachment to the notions of the Humoral Pathology, is perhaps the most accurate & interesting account which has been given of the subject. As Physiology became divested of the rubbish which had encumbered it, the confined notions of the ancients were abandoned, and the different temperaments are now held to arise from the various proportion of the parts of our system whether fluid or solid, and controuled by some moral & intellectual influence. These dispositions are marked by external characteristics, which may easily be distinguished. The sanguineous is ~~a~~ attended with ~~th~~ flaxen, ~~chestnut,~~ ~~or~~ auburn, or red hair; soft flesh; a full habit; a clear, flushed complexion; a fierce expression of the eye; and a temper ardent & passionate. This temperament predispones to inflammatory complaints. — The Bilious is marked by black, curly hair; ~~a~~ ~~brown~~ a figure muscular & manly, but not inclining to corpulence; a brown complexion; a pulse quick and active; and a temper fierce, ~~resentful~~ obstinate, and unrelenting. — Persons possessing this temperament are apt to be affected with ~~glandular affec~~ visceral disease, as inflammation of the liver &c. The Phlegmatic temperament is known also by the names of the Pituitous, lymphatic &c. It is marked by extreme smoothness of the skin, thin, white hair; ~~a languid~~

~~pulse~~ pale complexion; a weak or relaxed habit; a small pulse; a timid or irresolute mind. It predisposes to cachectic or nervous affections. The Melancholic temperament is known ~~from~~ by the following ~~sy~~ signs:- leanness of person; a dry skin; a dark complexion; hair & eyes of the same colour; a small — feeble pulse; great sensibility; and a temper peevish, fretful, morose, or gloomy. There is little physical or mental energy. Nervous diseases are the consequences of this temperament. (For a fuller account of the temperaments see some remarks which are contain in the notes on Chapman's Lectures for 1816, which he omitted this year.)

Next among the inherent causes of disease may be mentioned the influence of the passions & emotions of the mind. ~~Nor~~ Need you be told that this is of great importance. But it is not my design at ~~present~~ present, fully to develope their interesting nature:- I shall consider them only as articles of Path~~ology~~ology, or, in other words, as causes of disease. Little experience of the effects of the passions is required to persuade us, that they exert a great influence over the animal oeconomy, and are no slender source of mental affections. They have been divided into 2 classes, according as they are hurtful or salutary.

Examples of the first are fear, grief, despair, envy, jealousy, and, perhaps, revenge. These are destructive of health, & subversive of every comfort of life. Among the second class are hope, love, joy, ambition, & courage. Each of these is distinguished by certain peculiar signs. The malignant passions are characterized by a pale, haggard countenance; while those of an opposite description are marked by the cheerful smile, and the roseate hue of health. Before considering them separately I will remark, that ~~the p~~ those which are ~~dissimilar~~ opposite in their nature, are often uniform in their effects on the system. ~~Even these must con~~ Thus, as agents on the body, anger, & joy ~~have~~ are not dissimilar. Both increase the energy of the heart & arteries, swell the volume of the muscles, give the skin a ruddy hue, produce a determination of blood to the head, and impart fire & brilliancy to the eyes. They both produce apoplexy, convulsions, syncope, & other similar affections. Nevertheless there is a great difference in their operation; as every one must experience from his own consciousness. A person can always distinguish them in himself or others.-

In treating of the passions seperately, I commence with fear. This, when carried to any extent, is accompanied with a pale countenance, contracted skin, wildness of the eyes, distressing palpitation of the heart, painful frequency of respiration, a weak pulse, and a trembling, agitated condition of the body. But in cases where it is carried to a great height the effects are more violent. Extreme terror occasions a ghastly countenance, and sometimes a convulsive tremor over the whole frame; at others it is accompanied with a complete prostration of muscular power, & the person affected falls down in a state of Catalepsy. These are its consequences when ~~its~~ most sudden & vehement. But slight fear also proves the predisposing as well as exciting cause of disease. Every practitioner of Philadelphia has seen this exemplified in ~~some of~~ the epidemics which some time since visited ~~the~~ our city. At this season of general desolation, often has the spectacle of a passing corpse, ~~the sou noise~~ the sound of a hearse, ~~the~~ tolling of the bells, the intelligence of the loss of a friend, or an increase in the returns of the dead, actually excited the disease when it did not exist, and distressed those who were before slightly

affected. Nor is it under such circumstances only that fear produces disease. It also causes the various nervous disorders; & not unfrequently produces Diarrhoea, Diabetes, nausea, & suppression of the catamenia. In pregnant women it is apt to occasion uterine hemorrhage & abortion. Even insanity permanent & incurable, has resulted from a powerful shock of terror. —

Intense & long continued grief depresses the energy of the mind, & wastes the vigour of the body. It is accompanied with dejection of countenance, paleness of the skin; & more remotely with leanness & emaciation of the whole body. Sometimes it is so violent as to produce a train of severe & fatal consequences. It attacks the stomach & chylopoietic viscera, disordering the functions of these organs; and the mind finally is ~~so~~ brought into a state of furious derangement, or sinks into gloom & melancholy.

Not the least powerful of the passions which agitate the frame is jealousy. This is rarely simple. Compounded of hatred, suspicion, despair, revenge, it may be said to act with the combined power of all. It attacks the soul

with unremitting tortures, & preys on the heart like the famished harpies. But though eternally self-tormenting, it is not productive of many diseases. Cases, however, have occurred, when the brain has become disordered, with various shapes of intellectual alienation. The ancients supposed it to fix principally on the liver; and the "tenuem jecur" of Horace, must be familiar with the memory of every classic scholar. Perhaps the vulture feeding on the liver of Prometheus, is the same idea shadowed out & embodied in a poetical apologue. —

Anger is among the ~~most~~ most stimulating of the passions, & when exacerbated into rage it is sometimes productive of perfect madness. This passion is to the mind what a whirlwind is to the atmosphere. Given up to anger, a man is no longer under the control of reason; and is ready to commit every sort of rashness & indiscretion. ~~By determining blood to the head, which is indicated by the flushing of the face, & the fiery glare of the eye, Its effects are I before~~ Its physical effects are very much the same with those of joy. By the blood which it determines to the head, as is known

X

from the suffusion of the face, the fiery glare of the eye, and the violent pulsation of the carotids, it is apt to occasion affections of the brain, as mania & apoplexy. Many instances have been recorded, where men, in a paroxysm of this passion, have been suddenly cloven down by the hand of death. Of this fact Jno. Hunter is a memorable example. He fell into a violent rage in consequence of the improper application of some dressings, and immediately expired. Not long since a shoemaker of this city, being, while at work, very much pestered by some boys in the street, ran out of the shop, & fell down dead in the act of pursuing his tormentors. But these are not the only effects of anger. Like a debauch in wine, it predisposes the body to the invasion of many diseases. During the prevalence of Epidemicks this is particularly remarkable; & it is not less known that in the female sex, terror is apt to occasion hemorrhage from the lungs or uterus; and even to produce abortion. Such, then, being the evil consequences of this pernicious passion, I enjoin it on you, in the language of holy writ - "Suffer not the sun to go down on your wrath."

I next pass to those passions ~~which~~ & emotions which are of an opposite nature, or to those which have been denominated salutary; and first let us speak of love. It is obvious that this is prejudicial to health, only when ~~indulged in~~ in excess, or perverted from its ~~proper~~ true course. Love when successful, and properly regulated, is a state of feeling most natural & delightful. To ~~the~~ be the cause disease it must be ill regulated, or intemperately indulged. When disappointed in its object, it produces ~~sound~~ many sensible effects on the system. These have been an inexhaustible theme of the poets; & have sometimes come under the ~~care of the~~ physician's ~~care~~ notice. The mind & body are ~~sensibly~~ both affected; but the passion operates differently, according as it is attended with hope, or with despair. Let the most distant prospect of success remain, and the soul is agitated by a tumult of conflicting emotions: - but when hope is extinct, and despair seizes the mind of the lover, he ~~with~~ is either depressed into the gloom of melancholy, or is driven to actual insanity. To the other symptoms are added, Dyspepsia, & a long train of nervous affections.

Every one who has felt the effects of joy, knows it to be highly ~~stim~~ exhilerating, and stimulant. It agitates the whole frame, gives to the face a vivacity of expression, and produces a glow & flush on the countenance. The effects of excessive joy are Syncope, coma, apoplexy, & palsy. Many of you are familiar with the story of the Roman Matron, who died when she heard of the safety of her son, whom she had supposed killed in battle. The annals of our own country afford an instance of a similar nature. When the glorious intelligence of the surrender of Cornwallis was received, the janitor of congress, overcome by the impulse of an ardent patriotism, fell down lifeless in a fit of Apoplexy. —

Little less exciting than joy is the passion of Ambition. Legitimately indulged it is not injurious to health. Carried to a great extent, it has been called the infirmity of noble minds; and is apt to be illicit in its nature, or to grasp at objects too gigantic for its powers. When disappointed, it becomes the cause of ~~harassing~~ wearing (carking) cares, and ~~tormenting~~ solicitude; & the mind worn out by anxiety & trouble is prone to derangement; & the body is exposed to the attacks of many diseases. ~~Every history relates instances of the insanity~~ Every Hospital ~~affords instances of~~ contains some

victims of this lofty & generous passion. I have myself been witness to two remarkable cases: - one ~~man~~ had desired to lead his countrymen arms to victory; and the other had hoped by his eloquence, his energy, & wisdom, to sway the destinies of an empire. —

His now forgotten friend, a Snail.

(Date w

N 2.

[illegible]pon the wall against the seat
[illegible] Dressy us'd for her retreat,
[illegible]er by accident offended
[illegible]looking-glass was straight suspended,
[illegible]h it might show her how deform'd
[illegible] look'd, and frightful, when she storm'd;
And warn her, as she priz'd her beauty,
To bend her humour to her duty.
All this the Looking-glass achiev'd.
Its threats were minded, and believ'd.
The maid, who spurn'd at all advice,
Grew tame and gentle in a trice:
So when all other means had fail'd,
The silent monitor prevail'd. WILKIE.

SECTION [illegible].

The Butterfly and the Snail; or, elevation renders little minds proud and insolent.

All upstarts insolent in place,
Remind us of their vulgar race.
A[illegible] the sunshine of the morn,
A Butterfly (but newly born)
[illegible] proudly perking on a re[illegible]
With pert conceit his bosom [illegible]:
His wings (as glorious to behold)
Bedropt with azure, jet, and gold,
Wide he displays: the spangled dew

An open and a g[illegible] heart.
Refin'd from selfishness and art;
Patience which mocks at fortune's pow'r,
And wisdom neither sad nor sour.

Love to God produces love to men.

Let gratitude in acts of goodness flow,
Our love to God, in love to man below.
Be this our joy—to calm the troubled breast,
Support the weak, and succour the distrest;
Direct the wand'rer, dry the widow's tear;
The orphan guard, the sinking spirits cheer.
Tho' small our pow'r to act, tho' mean our skill,
God sees the heart; he judges by the will.

Men mutually helpful.

Nature expects mankind should share
The duties of the public care.
Who's born for sloth? To some we find
The plough-share's annual toil assign'd:
Some at the sounding anvil glow;
Some the swift-sliding shuttle throw:
Some studious of the wind and tide,
From pole to pole, our commerce guide:
While some with genius more refin'd,
With head and tongue assist mankind.
Thus, aiming at one common end,
Each proves to all a needful friend.

To bless, is to be blest.

When young, what honest triumph flesh'd my b[illegible]east,
This truth once known,—To bless is to [illegible]
[illegible] bending beggar on his way;